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Surgical management of distal tibial fractures with an external fixator

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Introduction: The treatment of unstable distal tibial metaphyseal fractures can be challenging. External fixation can be used in the emergency setting to stabilize the fracture before definitive treatment, or it can be used as the definitive treatment itself. This study assesses the outcomes and complications of such fractures treated by external fixation.

Methods: A retrospective case note and radiological review was carried out on all patients who had external fixation of distal tibial metaphyseal fractures at a single institute between November 2005 and October 2009. Mechanism of injury, fracture classification, treatment modality, union time, complications and final deformity were assessed.

Results: Thirty-seven patients were included in the study (21 men, 16 women), with an average age of 48 years (range 6–86). High energy trauma accounted for 18/37 fractures, most of the rest were the result of a fall at home. Fractures were classified according to the AO classification system: 8-42A; 14-43A; 9-43C; 2-43B; 1-42B; 1-42C; 1-44A; 1-44B. Nine fractures were open (Gustillo–Anderon I = 3; IIIa = 1; IIIb = 5). Taylor Spatial Frame was used in 23 cases, Hoffman II external fixator in 17, two patients were treated with OrthoFix. The average time to radiological and clinical union was 201 days (range 32–1122). Nineteen patients regained pre-op mobility, 11 developed pin-site infection, one died and one had below knee amputation. Two patients were referred for limb reconstruction and eight developed chronic pain and stiffness of the ankle. Two patients had >10° of deformity in the coronal/sagittal plane after union.

Conclusion: External fixation is effective in treating complex distal tibial fractures in the emergency and semi-elective setting, while minimising further soft tissue injury. The relative high superficial infection rate highlights the importance of adequate pin site care.

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2A.22

Fractured hip: the effects on coagulation and the outcome for those on warfarin

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Introduction: Warfarin is now used extensively for patients with certain vascular based diseases. These patients also have a high representation of fractured hips. There is a clinical priority hip fractures to be treated early to reduce mortality and hospital stay. An initially elevated INR and a slow response to warfarin reversal often delays surgery. In some cases a further rise in INR after warfarin cessation is also noted. We hypothesised that amongst patients with fractured hips a "coagulopathy" exists, which is the basis for warfanised patients to have unstable INR indices at admission. It is possible there is a local consumption of clotting factors at the hip fracture site and a more generalised coagulopathy in this frail cohort of patients. It was also suspected that the mortality risk after hip fracture was likely to be higher than normal in patients on warfarin.

Methods: A retrospective analysis of all patients from February 2008 to February 2009 admitted to University Hospital of North Staffordshire with fracture to the hip and with a pre-morbid use of warfarin were reviewed as a cohort. An INR of 1.7 or less was regarded as a safe preoperative level.

Results: Total 23 patients. The average INR was lower by 0.3 at 24 h after 1 mg intravenous vitamin K administration. On average it was 2 days before the INR was 1.7 or below. 21 patients had surgery of these 9 died (43%). All of these deaths were within 4 weeks of surgery. The other 2 patients were deemed too unfit for surgery and also died within 4 weeks. Therefore the total mortality risk for all the patients was 48%.

Conclusion: Our findings suggest that the response to vitamin K in warfarinised patients who sustain a hip fracture is less than the typical response to warfarinised patients similar quantities of vitamin K in controlled studies. This would support the theory that hip fractures are associated with an inherent "coagulopathy". The high early (48% within 4 weeks of surgery) mortality in our study cohort would also support an argument for more intense and thorough assessment of these patients and that surgery may be futile in some. If operative intervention is to be undertaken then a regime to ensure rapid warfarin reversal and early surgery with intensive pre-, peri- and postoperative care should be considered in order to try and improve survival in this vulnerable patient group.

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2A.23

A comparison of accuracy of different Trauma and Injury Severity Score (TRISS)-like models in different trauma populations

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Background: Because of a growing demand for an easy scoring, reliable and accurate model to evaluate quality of trauma care, this study compares different Trauma and Injury Severity Score (TRISS)-like models with regard to performance and power in different trauma populations.

Methods: A total number of 10,777 trauma patients admitted to our level 1 trauma centre between 1997 and 2006 were included in the analysis. The probability of survival for each patient was calculated if required data were present using the respective formulas of the prediction models of the Major Trauma Outcome Study (MTOS), Trauma Audit & Research Network (TARN) and Base Excess Injury Severity Scale (BISS). Subsequently new coefficients were calculated by logistic regression based on this dataset. Finally, the existing BISS model was extended with the Glasgow Coma Scale and also tested. The discriminative power of all original and updated models was calculated for several subsets of patients using the area under the ROC-curve (AUC), a parameter for prediction accuracy ranging from 0.5 until 1.0.

Results: Far most AUCs had a value of 0.8 or more. For the total population the TARN update 2007 model with new coefficients had the highest AUC (0.924). For the subset of patients in which all parameters for the various models were available the BISS model including GCS had the highest AUC (0.909). All models had a high discriminative power (AUC range 0.878–0.990) if patients were younger than 55 years. In older patients, patients with severe

head injury or intubated patients the discriminative power of the prediction models dropped.

Conclusions: Relative simple models, like MTOS, TARN and BISS predict mortality pretty reliably. Each model tested in our study had specific advantages and disadvantages. Discrimination power strongly depended on the case mix. The accuracy to predict the chance of survival decreases in severely injured and older patients head injury and comorbidity are likely to attribute to this phenomenon. Therefore adjustment for these factors in future models might be necessary.

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